# Revision of the endemic genera *Diplomphalus* and *Pseudomphalus* from New Caledonia (Gastropoda, Rhytididae)

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**ABSTRACT**
The genera *Diplomphalus* Crosse & Fischer, 1872 and *Pseudomphalus* Ancey, 1882 from New Caledonia are revised based on extensive new samples. Three *Diplomphalus* species occur on the main island of New Caledonia. *Diplomphalus mariei* (Crosse, 1867) is characterised by a callus which forms an arcuate lamella that projects from of the body whorl. *Helix seberti* Marie, 1881 and *Diplomphalus fischeri* Franc, 1953 are placed in the synonymy of *D. mariei*. *Diplomphalus solidula* Tryon, 1885 is separated from *D. mariei* for the first time as a distinct species. It differs in its callus being only slightly detached from the body whorl at its margin. *Diplomphalus vaysseti* (Marie, 1871) differs from *D. solidula* and *D. mariei* in possessing a weak callus which is not detached from the body whorl. *Helix volutella* Gassies, 1858 (not L. Pfeiffer, 1856) is placed in the synonymy of *D. vaysseti*. The two species from the Île Art (Îles Belep), *Diplomphalus cabriti* (Gassies, 1863) and *Diplomphalus montrouzieri* (Souverbie, 1858), differ from the species of the main island in their larger size. Relative to *D. cabriti*, *D. montrouzieri* is smaller and whitish without a brownish pattern and has weaker sculpture on the teleoconch. *Pseudomphalus megei* (Lambert, 1873) differs from the *Diplomphalus* species in its larger shell with rounded, widely overlapping whorls, a weaker sculpture and a narrower umbilicus and a short penis with a large conic flagellum and a fusiform vas deferens. *Diplomphalus fabrei* Crosse, 1875 is placed in the synonymy of *P. megei*. The distribution of all species is shown on maps.

**KEY WORDS**
Mollusca,
taxonomy,
distribution,
Pulmonata,
land snails,
endemic,
Australasia;
new synonyms.

**RÉSUMÉ**
*Révision de* Diplomphalus *et* Pseudomphalus*, genres endémiques de Nouvelle-Calédonie (Gastropoda, Rhytididae).*
Les genres *Diplomphalus* Crosse & Fischer, 1872 et *Pseudomphalus* Ancey, 1882 de Nouvelle-Caledonie sont révisés à partir de nombreux nouveaux échantillons. Trois espèces de *Diplomphalus* vivent sur la principale île de Nouvelle-Caledonie. *Diplomphalus mariei* (Crosse, 1867) se caractérise par un callus formant une lamelle arquée qui dépasse de la dernière spire. *Helix*

*seberti* Marie, 1881 et *Diplomphalus fischeri* Franc, 1953 sont mis en synonymie avec *D. mariei*. *Diplomphalus solidula* Tryon, 1885 est traitée pour la première fois comme une espèce distincte de *D. mariei*. Elle en diffère par son callus, qui n'est que légèrement détaché de la dernière spire au niveau de sa marge. *Diplomphalus vaysseti* (Marie, 1871) se différencie de *D. solidula* et *D. mariei* par la présence d'un callus peu développé, qui n'est pas détaché de la dernière spire. *Helix volutella* Gassies, 1858 (not L. Pfeiffer, 1856) est mis en synonymie avec *D. vaysseti*. Les deux espèces de l'Île Art (Îles Belep), *Diplomphalus cabriti* (Gassies, 1863) et *Diplomphalus montrouzieri* (Souverbie, 1858), diffèrent des espèces de l'île principale par leur plus grande taille. Comparée à *D. cabriti*, *D. montrouzieri* est plus petite, blanchâtre sans motif brunâtre, et possède une sculpture moins développée sur la téléoconque. *Pseudomphalus megei* (Lambert, 1873) diffère des espèces de *Diplomphalus* par sa coquille plus large, avec des spires arrondies se chevauchant largement, une sculpture peu développée, un ombilicus plus étroit et un pénis court avec un flagellum large et conique et un vas deferens fusiforme. *Diplomphalus fabrei* Crosse, 1875 est mise en synonymie avec *P. megei*. Des cartes donnent la répartition géographique de chaque espèce.

**MOTS CLÉS**
Mollusca,
taxonomie,
distribution,
Pulmonata,
gastéropodes terrestres,
endémique,
Australasia,
synonymes nouveaux.

## INTRODUCTION

*Diplomphalus* Crosse & Fischer, 1873 originally included several tightly coiled, biconcave rhytidid land snail taxa with a sunken spire endemic to New Caledonia. Ancey (1882) separated *Microphyura* Ancey, 1882 and *Pseudomphalus* Ancey, 1882 from *Diplomphalus*. Franc (1957) placed *Pseudomphalus* in the synonymy of *Diplomphalus*, but classified *Microphyura* as a distinct genus. Schileyko (2000, 2002) classified *Pseudomphalus* also as a distinct genus and transferred *Microphyura* to the Helicodiscidae. In the last revision of the group, Franc (1957) distinguished six *Diplomphalus* (sensu stricto) and one *Pseudomphalus* species. The distribution of the taxa in New Caledonia is virtually unknown.

This paper presents a comprehensive revision of the rhytidid genera *Diplomphalus* and *Pseudomphalus* based on more than 200 samples. The largest part of these samples was collected between 1978 and 1988 by P. Bouchet and S. Tillier, and collaborators. Only five newly delimited *Diplomphalus* species and one *Pseudomphalus* species are recognised. The exact distribution of the *Diplomphalus* and *Pseudomphalus* species, which was unknown so far, is summarised and illustrated in distribution maps.

## MATERIAL AND METHODS

This study is based on material from the collections of the Natural History Museum, London (NHM), the Field Museum of Natural History, Chicago (FMNH), the Muséum national d'Histoire naturelle, Paris (MNHN), the Royal Belgian Institute of Natural Sciences, Brussels (RBINS), and the Zoologisches Museum der Universität Hamburg (ZMH). The counting of the shell whorls (exactness 0.25) follows Kerney & Cameron (1979). Localities are listed from north to south. Distribution ranges were displayed on the map created by Richling (2009).

## SYSTEMATICS

### Family Rhytididae Pilsbry, 1893

### Genus *Diplomphalus* Crosse & Fischer, 1872

*Diplomphalus* Crosse & Fischer, 1872: 288. Type species (by monotypy): *Helix cabriti* Gassies, 1863.

Diagnosis. — *Diplomphalus* is characterised by a small (4.4-9.0 mm) biconcave shell with a deeply sunken spire,

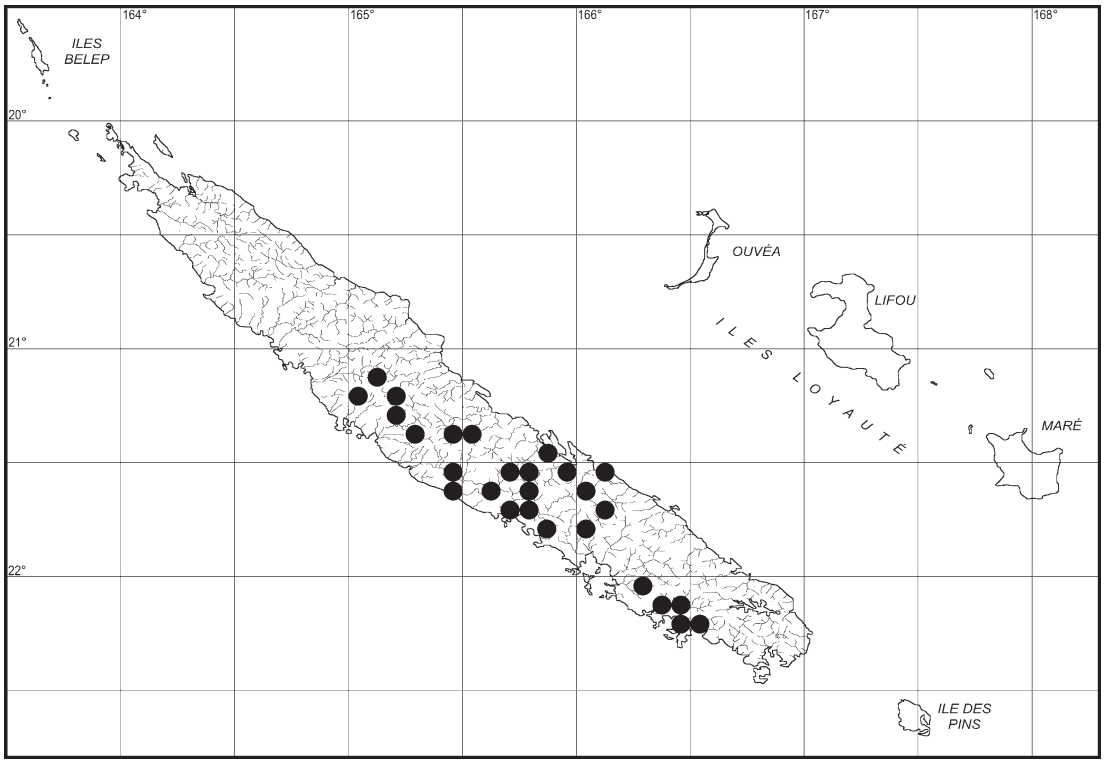



FIG. 1. — Distribution of *Diplomphalus mariei* (Crosse, 1867) (5' grid).

tightly coiled whorls with an edge at the upper and the basal side and a very wide umbilicus.

### ***Diplomphalus mariei*** (Crosse, 1867)
(Figs 1; 2; 3A; 4A, B; 5; 6A, B)

*Helix mariei* Crosse, 1867a: 211; type locality: "Koe in vicinio urbis Noumea dictae, Novae-Caledonidae humi sub arbore reperta", New Caledonia. — Crosse 1867b: 312, pl. 11 fig. 1. — Gassies 1871: 38, pl. 1 fig. 5.

*Diplomphalus mariei* – Crosse & Fischer 1873: 23. —Tryon 1885: 113, pl. 25, figs 6, 7 (in part). — Kobelt 1904: 88, pl. 14 figs 3-5 (in part). — Franc 1957: 178, pl. 23, fig. 236 (in part).

*Helix seberti* Marie, 1881: 241; type locality: " Kanala ", New Caledonia. **N. syn.**

*Diplomphalus* (*Diplomphalus*) *mariei* – Crosse 1895: 175 (in part).

*Diplomphalus* (*Diplomphalus*) *seberti* – Crosse 1895: 177, pl. 8, fig. 1.

*Diplomphalus seberti* – Kobelt 1904: 89, pl. 14, figs 9-11. Franc 1957: 177, pl. 23, fig. 234.

*Diplomphalus fischeri* Franc, 1953: 81, fig. 1; type locality: "Nouvelle-Calédonie"; 1957: 178, pl. 23, fig. 237. **N. syn.**

TYPE MATERIAL. — *H. mariei*: Koé, 22°08'S, 166°28'E, 3 possible syntypes (NHMUK 1883.11.10.842-844); *H. seberti*: Canala, 3 syntypes (MNHN; see also Crosse 1895: 177, pl. 8, fig. 1); *D. fischeri*: New Caledonia, many syntypes (MNHN 22960-22962; see also Franc 1957: 178, pl. 23, fig. 237).

OTHER MATERIAL EXAMINED. — New Caledonia (FMNH 36988; MNHN, among others voucher specimens to Franc 1957: 177, pl. 22, fig. 235 and p. 178, pl. 23, fig. 236; RBINS); Forêt Plate, 540 m alt., 21°08'57"S, 165°06'23"E (MNHN); Mt. Kopeto, 800 m alt., 21°10'39"S, 165°00'38"E (MNHN); Adio, valley, 180 m alt., 21°14'44"S, 165°14'46"E (MNHN); Adio, caves, 21°15'36"S, 165°14'18"E (MNHN); Barrage de la Neaoua

(Ouen Sieu), 500 m alt., 21°21'57"S, 165°32'35"E (MNHN; ZMH 79086); Bogui, 150 m alt., 21°23'21"S, 165°26'30"E (MNHN); Mines Emma-Pinpin, 50 m alt., 21°23'54"S, 165°16'51"E (MNHN); Col des Roussettes, 200 m alt., 21°24'53"S, 165°26'44"E (MNHN); Col des Roussettes, 270 m alt., 21°24'53"S, 165°26'44"E (MNHN); Col des Roussettes, E side, Bourail-Houailou, 365 m alt. (FMNH 158377); Bogui-Col des Roussettes, 270 m alt., 21°24'55"S, 165°26'49"E (MNHN); Mé Aiu, 730 m alt., 21°29'15"S, 165°51'00"E (MNHN); Koh, 150 m alt., 21°32'00"S, 165°48'50"E (MNHN); Canala, 21°32'S, 165°57'E (FMNH 73942, 110159; MNHN; RBINS); Mé Ori, 530 m alt., 21°32'18"S, 165°40'22"E (MNHN); Gelima, Caférie, 80 m alt., 21°32'24"S, 165°58'36"E (MNHN); Mé Ori, 530 m alt., 21°32'37"S, 165°40'21"E (MNHN); Table-Unio, 850-1000 m alt., 21°33'36"S, 165°45'55"E (MNHN); Bourail, 21°34'S, 165°29'E (FMNH 72860); 1.5 km inland from Pierced Rock, 8 km W of Bourail, 60 m alt. (FMNH 158347); Dothio-Col de Pétchékara, 340 m alt., 21°34'32"S, 166°06'32"E (MNHN); Col de Pétchékara, 450 m alt., 21°34'41"S, 166°05'48"E (MNHN); Oua-Oué, 50 m alt., 21°37'00"S, 165°35'07"E (MNHN); Col d'Amieu, summit, La Foa-Canala highway, 500 m alt., 21°37'S, 165°49'E (FMNH 158417, 158428); Nakada, 500 m alt., 21°38'57"S, 166°03'08"E (MNHN); Farino, 21°40'S, 165°46'E (RBINS); Fonwhary, 21°41'S, 165°47'E (RBINS); Mine de Moindou, 21°42'S, 165°41'E (FMNH 110158; RBINS); Mt. Ningua, 1000 m alt., 21°44'24"S, 166°09'03"E (MNHN); Col de Nassirah, 250 m alt., 21°46'44"S, 166°04'14"E (MNHN); Oua-Tom, 130 m alt., 21°47'15"S, 165°54'00"E (MNHN); Oua Tom, 20 km N of Boulouparis, gully, 60 m alt., 21°48'S, 165°54'E (FMNH 158400, 158411 in part); Mont Mou, 400 m alt., 22°04'28"S, 166°19'46"E (MNHN); Col de la Pirogue, Mont Mou, 450 m alt., 22°05'S, 166°20'E" (FMNH 144255); Monts des Koghis, 18 km N of Nouméa, 450 m alt. (FMNH 158280); Nouméa, 22°16'S, 166°27'E (MNHN).

Distribution (Fig. 1). — *Diplomphalus mariei* is restricted to the central part of New Caledonia. Its range overlaps those of *D. solidula* Tryon, 1885 and *D. vaysseti* (Marie, 1871), demonstrating that it is specifically distinct from these species. At some localities it has been found even syntopically with *D. vaysseti*. There is an old sample that is allegedly from Ouégoa (RBINS) in the northern part of the main island of New Caledonia where *D. mariei* has not been found for more than a century, although several expeditions have collected there.

Diagnosis. — *Diplomphalus mariei* differs from *D. solidula* and *D. vaysseti* in a usually broader aperture (da/ha = 0.6-1.7 in *D. mariei*, 0.5-0.7 in *D. solidula*, 0.4-0.8 in *D. vaysseti*) and a callus forming an arcuate lamella projecting from the body whorl. The whorls of *D. mariei* insert basally close to the edge of the previous whorl, whereas the whorls of *D. solidula* and *D. vaysseti* insert basally farther outside (and thus below) the edge of the previous whorl. Therefore the umbilical concavity of *D. solidula* and *D. vaysseti* is more stepped than that of *D. mariei*.

Description

Shell (Fig. 2; 3A; Table 1) biconcave; spire deeply sunken, with 6.75-7 whorls with an edge at upper side, which can be compressed to form a keel, and an edge at basal side; protoconch initially smooth, then with microscopic spiral striae; teleoconch with moderately coarse, regular ribs (20-42 per quarter on upper side of body whorl) at upper and basal side that can split into 2 finer ribs at outer side of whorls between upper and lower edge and microscopic spiral threads; brownish-corneous with reddish-brown diagonal stripes; aperture pear-shaped, wider below than above; upper insertion of peristome distinctly descending towards aperture; peristome expanded, slightly reflexed, slightly thickened; insertions of peristome connected by a strong callus forming an arcuate lamella that projects from body whorl, especially in its middle; aperture without lamellae or folds; umbilicus wide.

Genitalia (Fig. 4A, B). Specimens from Col de Pétchékara and Col de Nassirah were examined. The genital pore is situated just posterior to the right ommatophore. The genitalia run to the right of the right ommatophoral retractor. Penis long and slightly broadened near the subterminal insertion of the vas deferens. There are straight longitudinal pilasters in proximal part of penis. Two strong longitudinal pilasters form a U-shaped structure. Opposite of the longitudinal pilasters, the penial wall is sculptured by wavy transversal pilasters. The narrow distal part of penis is sculptured with longitudinal pilasters. Penial retractor inserting terminally at penis and at diaphragm. Vas deferens divided in thin distal section running along penis towards atrium and thicker proximal section along vagina and free oviduct. Vagina shorter than free oviduct. Oviduct consisting of short narrower distal section and broader, longer glandular proximal section. Reservoir of bursa copulatrix only slightly broadened.




Fig. 2. — *Diplomphalus* spp., shells: **A**, *Diplomphalus mariei* (Crosse, 1867), New Caledonia: Koé (possible syntype of *H. mariei*, NHMUK 1883.11.10.842-844); **B**, *Diplomphalus mariei*, New Caledonia: Canala (syntype of *H. seberti*, MNHN); **C**, *Diplomphalus mariei*, New Caledonia (syntype of *D. fischeri*, MNHN 22960). Scale bar: 1.0 mm.

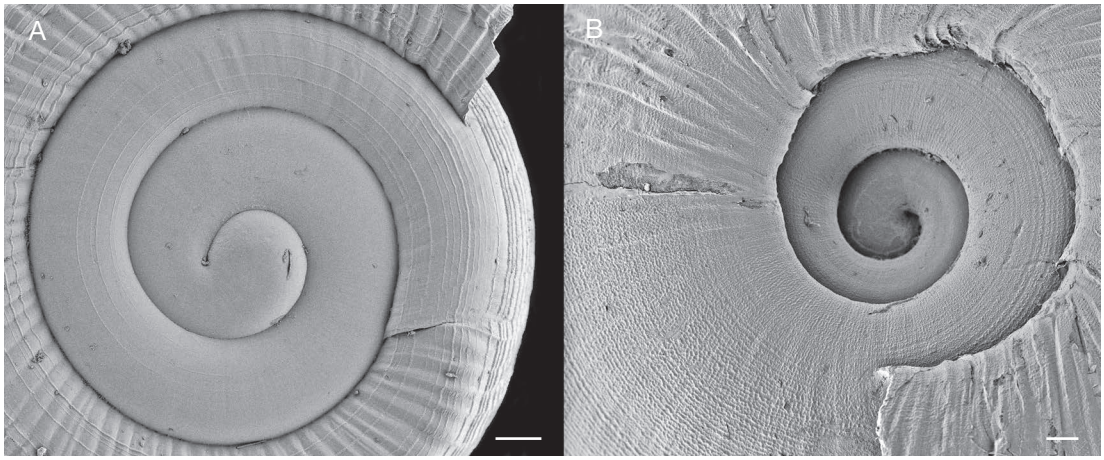



Fig. 3. — *Diplomphalus* and *Pseudomphalus* spp., protoconch: **A**, *Diplomphalus mariei* (Crosse, 1867), New Caledonia: Oua-Tom (MNHN); **B**, *Pseudomphalus megei* (Lambert, 1873), New Caledonia: Bogui-Col des Rousettes (MNHN). Scale bars: 100 µm.

Mantle collar and pallial complex (Fig. 5). Mantle collar broad (integument inserts deeply at the mantle edge), forming a narrow rim around the body without large lobes; only the region around the pneumostome is distinctly thickened; this thickening may form minute lobes at the edge. Heart about half as long as kidney, continuing anteriorly into indistinct pulmonary vein. Lung without additional coarse venation. Kidney long, opening anteriorly into reflexed primary ureter. Primary ureter running to the extreme posterior corner of the pulmonary cavity, where it transitions into the tubular secondary ureter, running along hindgut to the pnemostome, opening shortly before mantle collar, continuing anteriorly as a groove. There is no distinct mantle gland posterior to the mantle collar.

Radula (Fig. 6A, B). Narrow; central teeth rudimentary, straight, stylet-like; 8 about equally long, slender, unicuspid lateral teeth on each side in V-shaped rows; basal half of lateral teeth attached with a small projection to the membrane, apical part curved towards the centre.

Remarks

*Helix seberti* Marie, 1881 and *Diplomphalus fischeri* Franc, 1953 are synonymised here with *Diplomphalus mariei*, because they fall into the range of variation of this species.

### ***Diplomphalus solidula*** Tryon, 1885
(Figs 4C; 7; 8A)

*Diplomphalus mariei* var. β – Crosse 1874: 387, pl. 12, fig. 1.

*Diplomphalus mariei* var. *solidula* Tryon, 1885: 114, pl. 25, fig. 10; type locality: "Baie du Sud" (see Crosse 1874: 387), New Caledonia.

*Diplomphalus* (*Diplomphalus*) *mariei* – Crosse 1895: 175 (in part).

*Diplomphalus* (*Diplomphalus*) *mariei* var. β *Solidula* – Crosse 1895: 176.

*Diplomphalus mariei* var. *solidula* – Kobelt 1904: 89.

*Diplomphalus mariei* – Franc 1957: 178 (in part, not Crosse 1867).

*Diplomphalus vaysseti* – Franc 1957: 177, pl. 22, fig. 235 (in part, not Marie 1871).

Type material. — *D. mariei* var. *solidula*: Baie du Sud, syntype (MNHN; voucher specimen of Crosse 1874: 387, pl. 12, fig. 1).

Other material examined. — New Caledonia (MNHN, among others the voucher specimen of Franc [1957: 177, pl. 22, fig. 235]; RBINS); Baie du Sud (MNHN; RBINS); S of top of Mt. Ouin, 1150-1200 m alt., 22°00'58"S, 166°28'21"E (MNHN); Vallée Ouinné, 650 m alt., 22°02'23"S, 166°32'28"E

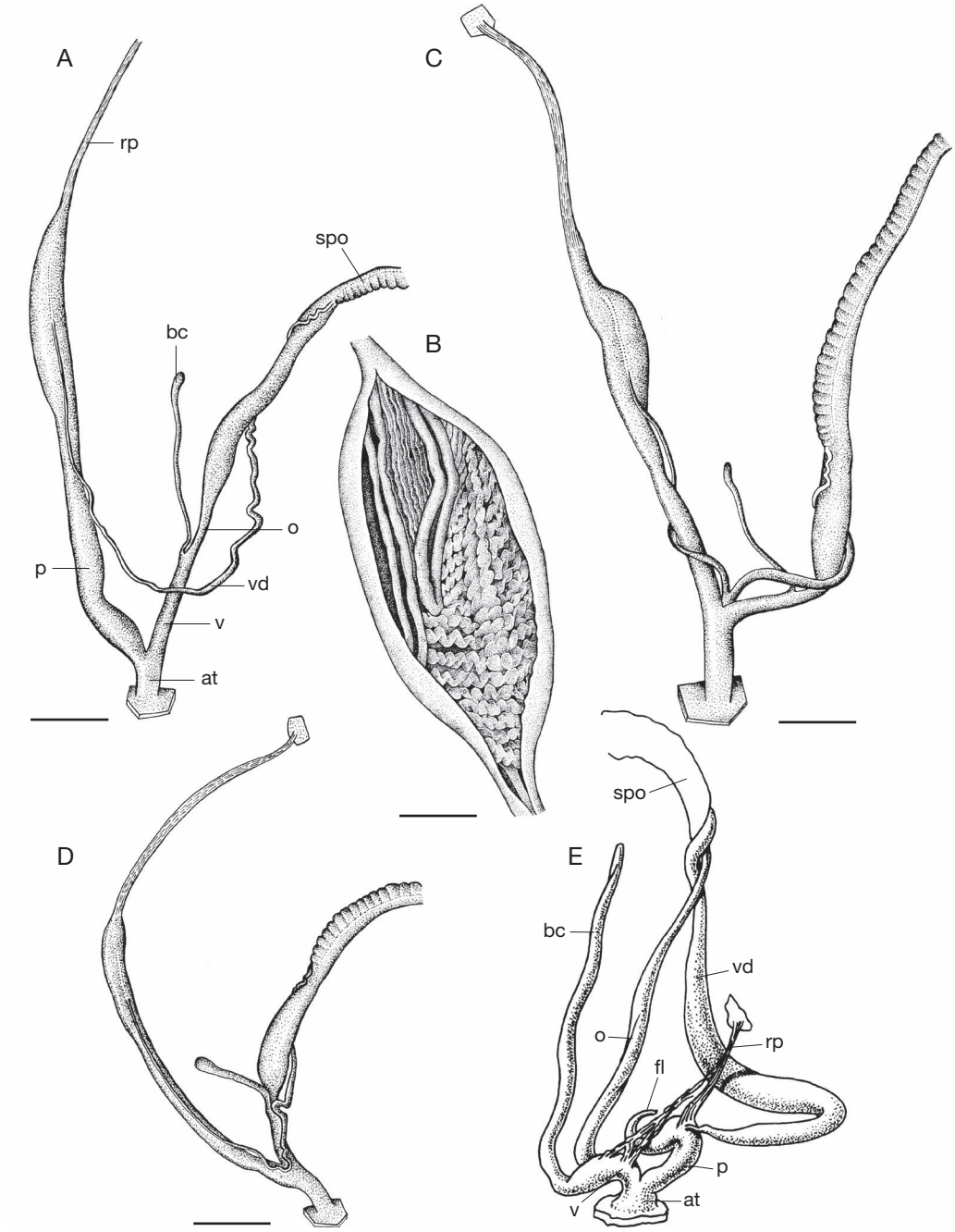



Fig. 4. — *Diplomphalus* and *Pseudomphalus* spp., genitalia: **A**, *Diplomphalus mariei* (Crosse, 1867), New Caledonia: Col de Pétchékara (MNHN); **B**, idem, internal structure of the penis; **C**, *Diplomphalus solidula* Tryon, 1885, New Caledonia: Baie Ngo (MNHN); **D**, *Diplomphalus vaysseti* (Marie, 1871), New Caledonia: Col d'Amos (MNHN); **E**, *Pseudomphalus megei* (Lambert, 1873), New Caledonia: sud du Grand Lac (reproduced from Schileyko 2000: fig. 979B). Abbreviations: **at**, genital atrium; **bc**, bursa copulatrix; **fl**, flagellum; **o**, free oviduct; **p**, penis; **rp**, penial retractor; **spo**, spermoviduct; **v**, vagina; **vd**, vas deferens. Scale bars: A, C, D, 1.0 mm; B, 0.5 mm; E, not to scale.

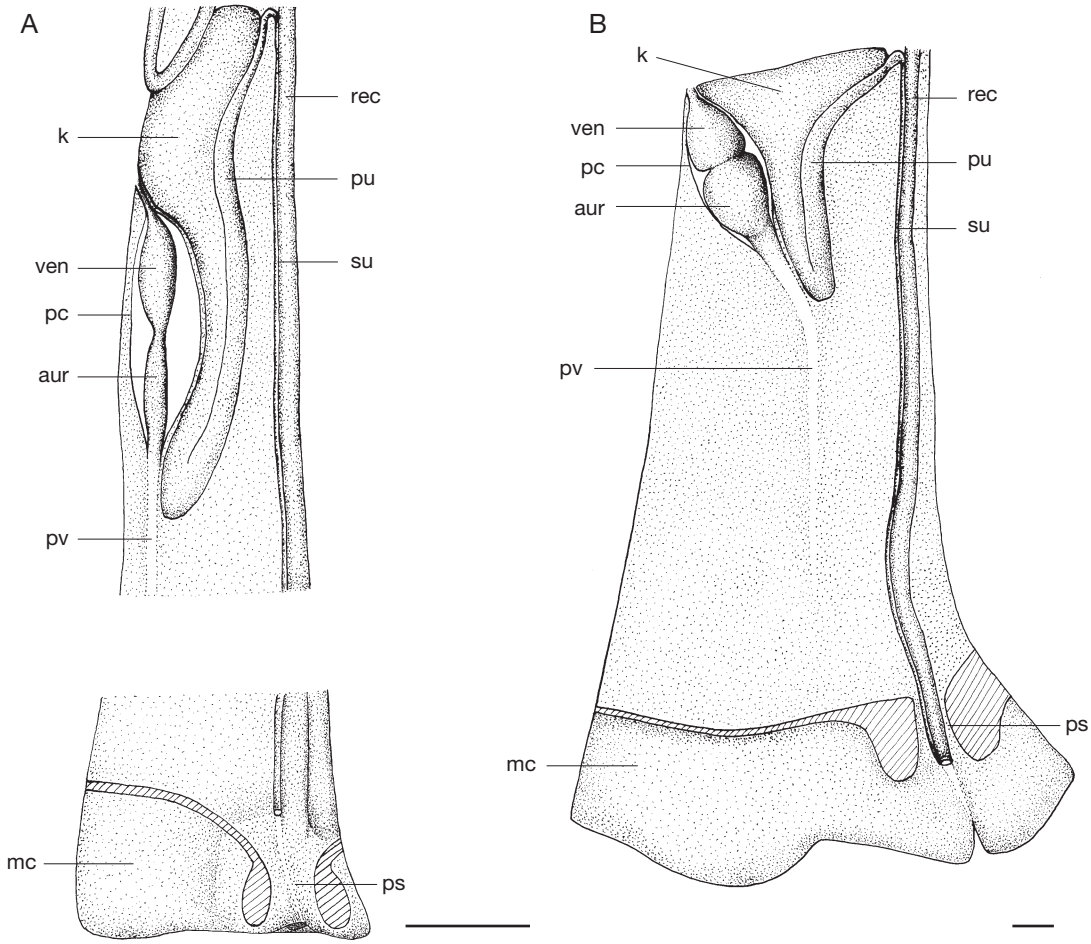



Fig. 5. — *Diplomphalus* and *Pseudomphalus* spp., mantle collar and pallial complex: **A**, *Diplomphalus mariei* (Crosse, 1867), New Caledonia, Col de Pétchékara (MNHN); **B**, *Pseudomphalus megei* (Lambert), New Caledonia, Rivière Bleue, 170 m alt. (MNHN). Abbreviations: **aur**, auricle; **k**, kidney; **mc**, mantle collar; **pc**, pericardium; **ps**, pneumostome; **pu**, primary ureter; **pv**, pulmonary vein; **rec**, rectum; **su**, secondary ureter; **ven**, ventricle. Scale bars: 1 mm.

(MNHN); Haute Rivière Bleue, 300 m alt., 22°04'07"S, 166°36'28'"E (MNHN); Baie du Sud (MNHN); Piste de la Pourina, 520 m alt., 22°05'00"S, 166°41'45"E (MNHN); Mt. Kouvélè, E slope, 660 m alt., 22°05'26"S, 166°26'56"E (MNHN); Rivière Bleue, 150 m alt., 22°05'47"S, 166°39'25"E (MNHN); Rivière Bleue, 170 m alt., 22°05'59"S, 166°40'01"E (MNHN); Rivière Bleue, 160 m alt., 22°06'13"S, 166°39'16"E (MNHN); Parc à Cagous, Rivière Blanche, 160-170 m alt., 22°08'09"S, 166°38'20"E (MNHN; ZMH 79089); near Mt. Ouenarou, 30 km NE of Nouméa (towards Yaté), 250 m alt., 22°10'S, 166°43'E (FMNH 158273, 158361); Mont Guemba, 200 m alt., 22°10'22"S, 166°56'10"E (MNHN); Mouirange, 180-250 m alt., 22°12'00"S, 166°39'00"E (MNHN); Route les Dalmates, Monts Kouanenoa, E of St. Louis, 22°12'S, 166°42'E" (FMNH 144227); Mouirange, 200 m alt., 22°13'19"S, 166°40'14"E (MNHN); S of Grand Lac, 280 m alt., 22°16'31"S, 166°54'00"E (MNHN); Nouméa, Pointe de l'Artillerie, 22°17'S, 166°26'E (RBINS); Forêt Nord, 200-250 m alt., 22°17'00"S, 166°53'00"E (MNHN); Baie Ngo, 30 m alt., 22°18'02"S, 166°42'49"E (MNHN; ZMH 79085); Baie du Prony (RBINS); Kwa Néie (Mts. Néngoné), 470 m alt., 22°19'09"S, 166°55'12"E (MNHN).

Distribution (Fig. 7). — *Diplomphalus solidula* is restricted to the part of New Caledonia south of 22°S.

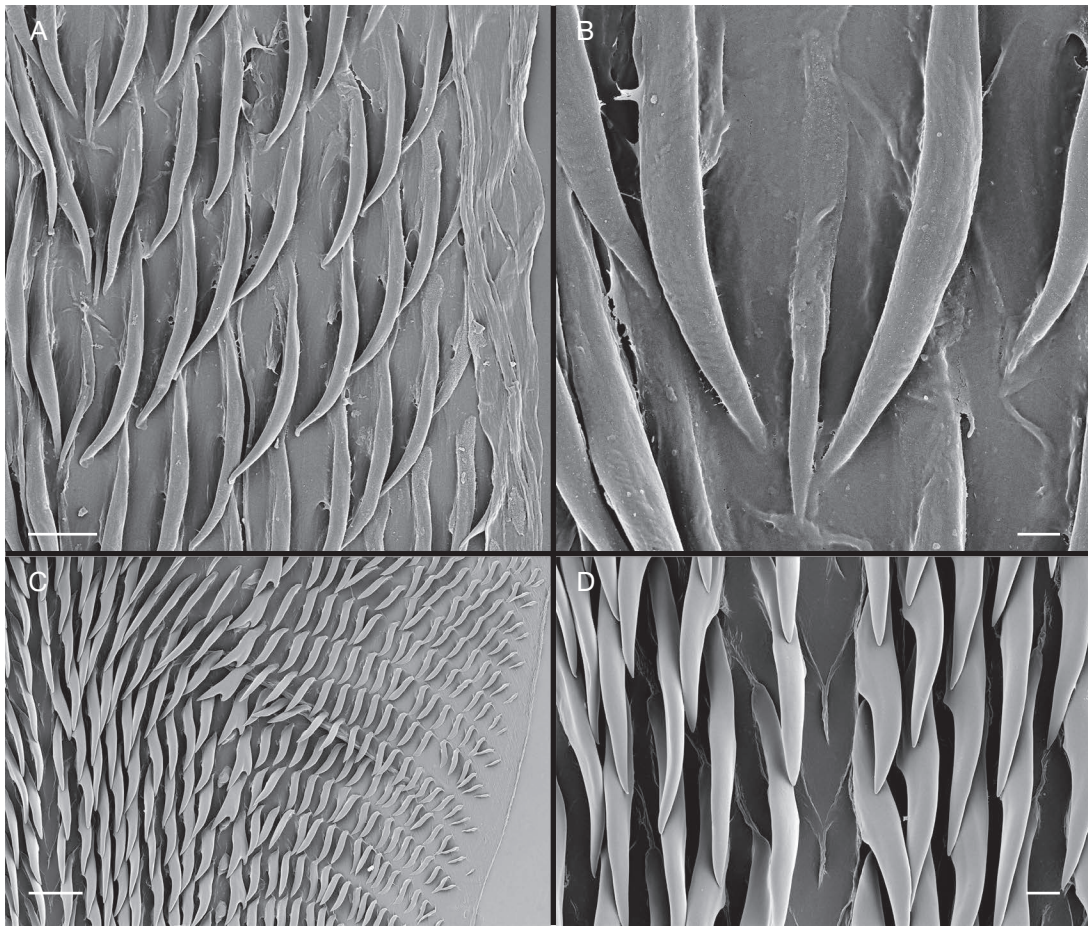



FIG. 6. — *Diplomphalus* and *Pseudomphalus* spp., radula. **A**, **B**, *Diplomphalus mariei* (Crosse, 1867), New Caledonia, Col de Pétchékara (MNHN); **C**, **D**, *Pseudomphalus megei* (Lambert, 1873), New Caledonia, Rivière Bleue, 170 m alt. (MNHN). Scale bars: A, D, 10 µm; B, 2 µm; C, 50 µm.

DIAGNOSIS. — *Diplomphalus solidula* is characterised by a strong callus which extends a little forwards from the aperture and is slightly detached from the body whorl at its margin.

## DESCRIPTION

Shell (Fig. 8A; Table 1) biconcave; spire deeply sunken, with 6.0-7.25 whorls with an edge at upper side and a weaker edge at the basal side; protoconch smooth; teleoconch with coarse, regular ribs (19-29 per quarter on the upper side of the body whorl) at upper and basal side that usually split into 2-3 finer ribs at outer side of whorls between upper and lower edge and microscopic spiral threads; brownish-corneous with reddish-brown transverse stripes; aperture unequally crescentic, wider below than above; upper insertion of peristome distinctly descending towards aperture; peristome not expanded, not or slightly reflexed, slightly thickened; insertions of peristome connected by a strong callus which extends a little forwards from aperture and is slightly detached from body whorl at its margin; aperture wuthout lamellae or folds; umbilicus wide.

Genitalia (Fig. 4C). Specimens from Baie Ngo were examined. Penis long and broadened near subterminal insertion of vas deferens. There are

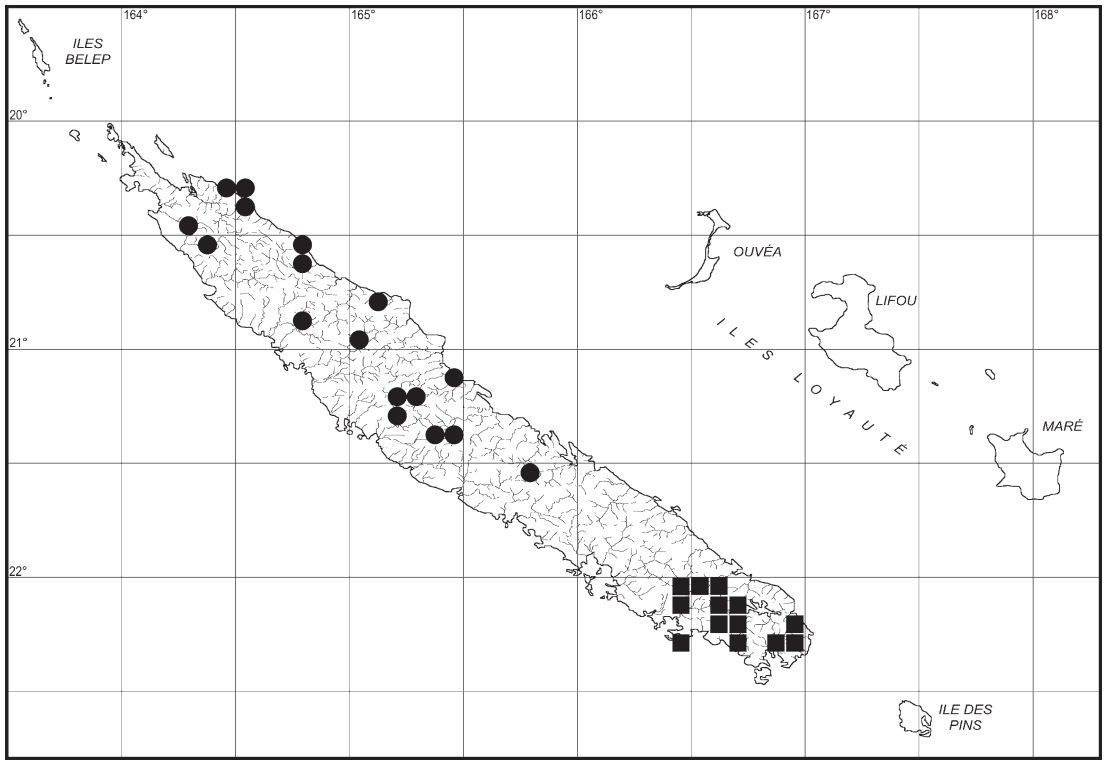



FIG. 7. — Distribution of *Diplomphalus solidula* Tryon, 1885 (■) and *Diplomphalus vaysseti* (Marie, 1871) (●).

straight longitudinal and wavy transversal pilasters inside the penis. Penial retractor inserts terminally at penis and at diaphragm. Vas deferens divided in thin distal section running along penis towards atrium and thicker proximal section along vagina and free oviduct. Vagina shorter than free oviduct. Oviduct consisting of short narrower distal section and broader, longer glandular proximal section. Reservoir of thin bursa copulatrix only slightly broadened.

### ***Diplomphalus vaysseti*** (Marie, 1871) (Figs 4D; 7; 8B)

*Helix volutella* Gassies, 1858: 70 (not L. Pfeiffer, 1856); type locality: "bois de Balade", New Caledonia. N. syn.

*Helix Cabriti* – Gassies 1863: 21, pl. 1, fig. 4 (in part, not Gassies 1863).

*Helix cabriti* – Crosse 1867b: 315 (in part, not Gassies 1863).

*Helix vaysseti* Marie, 1871: 325; type locality: "dans les montagnes, au cap Colnett", New Caledonia.

*Diplomphalus cabriti* – Crosse & Fischer 1873: 22 (in part, not Gassies 1863). — Kobelt 1904: 87 (in part, not Gassies 1863). — Franc 1957: 176 (in part, not Gassies 1863).

*Diplomphalus vaysseti* – Crosse & Fischer 1873: 23. — Crosse 1874: 388, pl. 12, fig. 2. — Tryon 1885: 113, pl. 25, figs 1-3. — Kobelt 1904: 89, pl. 14, figs 6-8. — Franc 1957: 177 (in part).

*Helix vaysseti* – Gassies 1880: 33, pl. 1, fig. 21.

*Diplomphalus* (*Diplomphalus*) *cabriti* – Crosse 1895: 173 (in part, not Gassies 1863).

*Diplomphalus* (*Diplomphalus*) *vaysseti* – Crosse 1895: 176.

TYPE MATERIAL. — Unknown.

MATERIAL EXAMINED. — New Caledonia (FMNH 36986; MNHN); Col d'Amos, 200 m alt., 20°18'52"S,

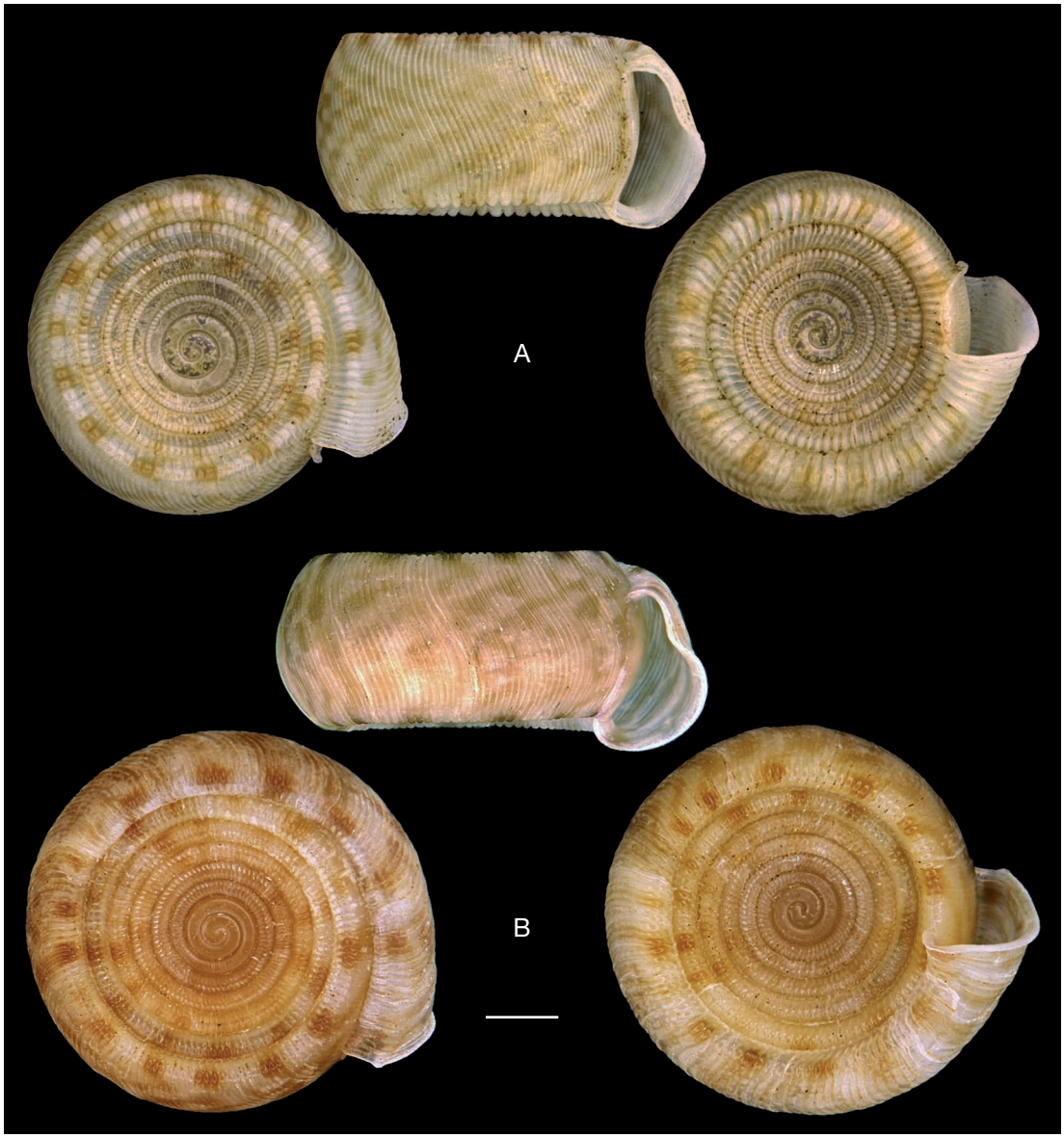



FIG. 8. — *Diplomphalus* spp., shells: **A**, *Diplomphalus solidula* Tryon, 1885, New Caledonia: Baie du Sud (syntype, MNHN); **B**, *Diplomphalus vaysseti* (Marie, 1871), New Caledonia: Thiem (MNHN). Scale bar: 1.0 mm.

164°25'20"E (MNHN); Balade, 20°19'S, 164°30'E (Gassies, 1858); 6.5 km E of Ouegoa, 120 m alt. (FMNH 158250, 159347); 8 km inland from Koumac, 90 m alt. (FMNH 158300); Mandjelia, 400 m alt., 20°22'29"S, 164°30'06"E (MNHN); Le Cresson, 20°29'00"S, 164°18'36"E (MNHN); Cap Colnett, 20°30'S, 164°45'E (Marie 1871); Kaala-Gomen, Konio, "la Cathédrale", 350-450 m alt., 20°34'30"S, 164°24'12"E (MNHN); Mont Panié near Tao (FMNH 159344); Mont Panié, 280 m alt., 20°35'27"S, 164°48'43"E (MNHN); Mont Panié, 580 m alt., 20°35'54"S, 164°48'22"E (MNHN); Thiem,

TABLE 1. — Shell measurements (in mm) and ratios of *Diplomphalus* Crosse & Fischer, 1872 species. Abbreviations: **D**, shell diameter; **D5W**, diameter of the first five whorls; **da**, diameter of the aperture; **H**, shell height; **ha**, height of the aperture; **max**, maximum; **min**, minimum; **n**, number of measured specimens; **RD**, ribs per quarter of the upper side of the body whorl; **std**, standard deviation; **U**, umbilicus; **W**, number of whorls.

| | D | D5W | H | da | ha | U | W | RD | D/H | H/ha | da/ha | U/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Diplomphalus mariei*, Canala, n = 30** | | | | | | | | | | | | |
| min | 5.8 | 3.0 | 2.0 | 1.2 | 1.1 | 3.8 | 6.5 | 31 | 2.5 | 1.3 | 0.8 | 0.6 |
| max | 6.8 | 3.6 | 2.5 | 2.0 | 1.8 | 4.7 | 7.5 | 42 | 3.2 | 2.1 | 1.7 | 0.7 |
| mean | 6.2 | 3.3 | 2.2 | 1.4 | 1.4 | 4.1 | 6.9 | 34 | 2.8 | 1.6 | 1.0 | 0.7 |
| std | 0.3 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.0 |
| ***D. mariei*, various other localities, n = 30** | | | | | | | | | | | | |
| min | 4.7 | 2.6 | 1.8 | 1.0 | 1.3 | 2.8 | 5.75 | 20 | 2.0 | 1.1 | 0.6 | 0.6 |
| max | 6.7 | 3.5 | 3.0 | 1.6 | 2.0 | 4.4 | 7 | 39 | 3.0 | 1.8 | 1.1 | 0.7 |
| mean | 5.3 | 3.1 | 2.3 | 1.3 | 1.6 | 3.3 | 6.5 | 29 | 2.4 | 1.4 | 0.8 | 0.6 |
| std | 0.5 | 0.2 | 0.3 | 0.1 | 0.2 | 0.4 | 0.0 | 0.4 | 0.2 | 0.2 | 0.1 | 0.0 |
| ***D. solidula*, various localities, n = 20** | | | | | | | | | | | | |
| min | 5.0 | 2.7 | 2.4 | 1.0 | 1.7 | 2.9 | 6 | 19 | 2.0 | 1.2 | 0.5 | 0.6 |
| max | 5.7 | 3.2 | 2.7 | 1.4 | 2.4 | 3.5 | 7.25 | 29 | 2.3 | 1.5 | 0.7 | 0.6 |
| mean | 5.3 | 3.0 | 2.5 | 1.2 | 2.0 | 3.1 | 6.5 | 24 | 2.1 | 1.3 | 0.6 | 0.6 |
| std | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 3.2 | 0.1 | 0.1 | 0.1 | 0.0 |
| ***D. vaysseti*, various localities, n = 20** | | | | | | | | | | | | |
| min | 4.4 | 2.1 | 2.3 | 1.0 | 1.8 | 2.6 | 6.5 | 20 | 1.6 | 1.0 | 0.4 | 0.6 |
| max | 6.5 | 3.1 | 2.8 | 1.4 | 2.4 | 4.4 | 8.5 | 36 | 2.6 | 1.4 | 0.8 | 0.7 |
| mean | 5.3 | 2.4 | 2.5 | 1.2 | 2.1 | 3.2 | 7.3 | 26 | 2.1 | 1.2 | 0.6 | 0.6 |
| std | 0.6 | 0.2 | 0.1 | 0.1 | 0.2 | 0.4 | 0.4 | 3.7 | 0.2 | 0.1 | 0.1 | 0.0 |
| ***D. cabriti*, various localities, n = 10** | | | | | | | | | | | | |
| min | 8.2 | 2.5 | 4.0 | 2.0 | 3.6 | 5.0 | 8.75 | 26 | 1.6 | 1.0 | 0.4 | 0.6 |
| max | 9.0 | 2.7 | 4.4 | 2.4 | 4.1 | 5.9 | 9.75 | 39 | 2.6 | 1.4 | 0.8 | 0.7 |
| mean | 8.6 | 2.6 | 4.2 | 2.1 | 3.7 | 5.5 | 9.3 | 32 | 2.1 | 1.2 | 0.6 | 0.6 |
| std | 0.3 | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.4 | 3.7 | 0.1 | 0.0 | 0.0 | 0.0 |
| ***D. montrouzieri*, various localities, n = 14** | | | | | | | | | | | | |
| min | 6.7 | 2.6 | 3.4 | 1.6 | 3.2 | 4.2 | 8 | 21 | 1.9 | 1.0 | 0.4 | 0.6 |
| max | 7.9 | 2.9 | 4.1 | 2.0 | 3.9 | 5.1 | 8.5 | 31 | 2.1 | 1.1 | 0.5 | 0.7 |
| mean | 7.5 | 2.7 | 3.8 | 1.7 | 3.6 | 4.7 | 8.3 | 26 | 2.0 | 1.0 | 0.5 | 0.6 |
| std | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 2.5 | 0.1 | 0.0 | 0.0 | 0.0 |

10-50 m alt., 20°45'43"S, 165°06'23"E (MNHN); Thiem, 90 m alt. (FMNH 158326); valley SW of Oua Tilou, 200 m alt., 20°52'03"S, 164°49'49"E (MNHN); Col Tango, way from Bobeitio, 300-350 m alt., 20°58'29"S, 165°00'27"E (MNHN); Monéo, 21°09'36"S, 165°29'31"E (MNHN); Mt. Aoupinié, 600-700 m alt., 21°10'47"S, 165°17'59"E (MNHN); Adio, valley, 180 m alt., 21°14'44"S, 165°14'46"E (MNHN); Adio, caves, 21°15'36"S, 165°14'18"E (MNHN; ZMH 79087); 15 km NE of Poya, inland of Nékliaï, 150 m alt. (FMNH 158358); Mé Maoya, 1250 m alt., 21°22'09"S, 165°20'21"E (MNHN); Col des Roussettes, 200 m alt., 21°24'53"S, 165°26'44"E (MNHN); Bogui-Col des Roussettes, 270 m alt., 21°24'55"S, 165°26'49"E (MNHN); Table-Unio, 850-1000 m alt., 21°33'36"S, 165°45'55"E (MNHN).

DISTRIBUTION (Fig. 7). — *Diplomphalus vaysseti* is restricted to the northern part of New Caledonia. The gap between the distribution areas of *D. vaysseti* and *D. solidula* is not as large as shown in Figure 7. There is a juvenile specimen from Oua Tom (FMNH 158411 in part) in the intermediate region which belongs to one of the two species.

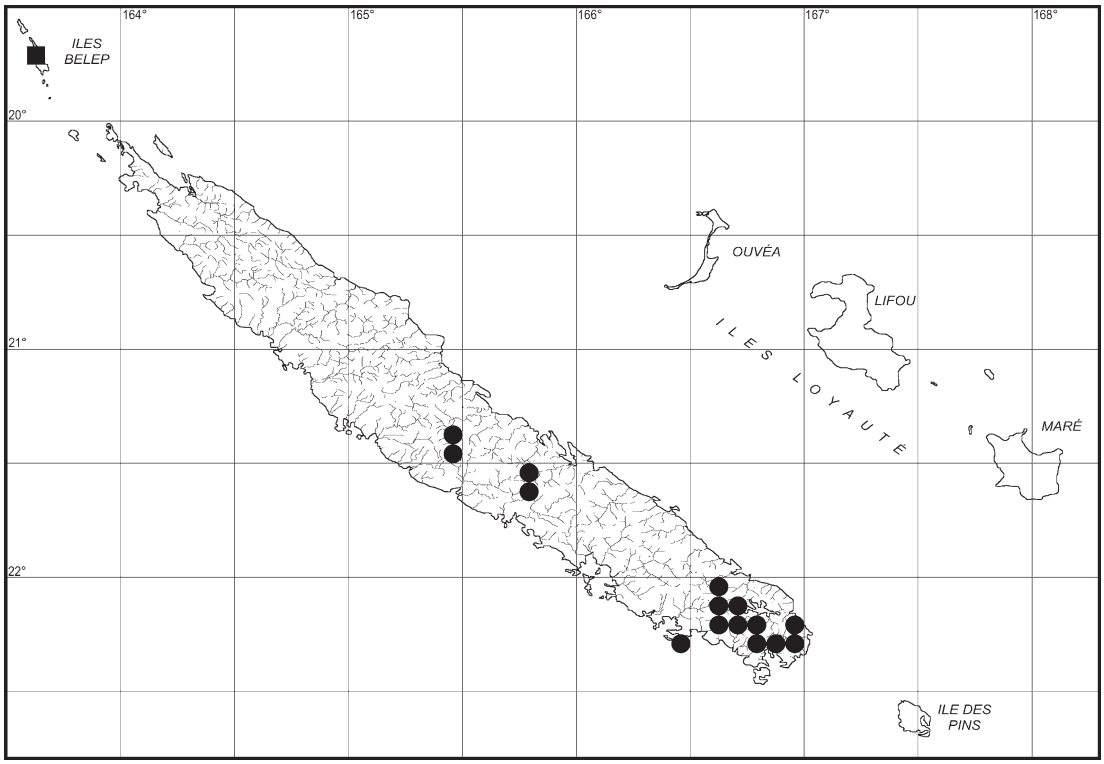



FIG. 9. — Distribution of *Diplomphalus cabriti* (Gassies, 1863) and *Diplomphalus montrouzieri* (Souverbie, 1858) (■) and *Pseudomphalus megei* (Lambert, 1873) (●).

DIAGNOSIS. — *Diplomphalus vaysseti* differs from *D. solidula* and *D. mariei* in a usually weak callus not detached from the body whorl and an on average denser coiling, i.e. a lower diameter at the same number of whorls. At five whorls the diameter of *D. vaysseti* varies usually from 2.1-2.7 mm, in *D. solidula* from 2.7-3.2 mm and in *D. mariei* from 2.6-3.5 mm. *D. vaysseti* differs from *D. cabriti* in a smaller shell (diameter: 4.4-6.5 mm v 8.2-9.0 mm in *D. cabriti*).

## DESCRIPTION

Shell (Fig. 8B; Table 1) biconcave; spire deeply sunken, with 6.5-8 whorls with an edge at upper side and an edge at basal side; protoconch initially smooth, then with microscopic spiral striae; teleoconch with coarse, regular ribs (20-36 per quarter on upper side of body whorl) at upper and basal side that can split into two finer ribs at outer side of whorls between upper and lower edge and microscopic spiral threads; brownish-corneous with a reticulate pattern of reddish-brown diagonal stripes; aperture unequally crescentic, wider below than above; upper insertion of peristome slightly descending towards aperture; upper part of peristome slightly protruding, lower part slightly reflexed, not expanded, slightly thickened; insertions of peristome connected by a weak callus which might extend a little forwards from aperture, but is not detached from body whorl; aperture without lamellae or folds; umbilicus wide.

Genitalia (Fig. 4D). Specimens from Col d'Amos and Bogui-Col des Roussettes were examined. Penis narrow and long and slightly broadened near subterminal insertion of vas deferens. There are straight longitudinal pilasters inside penis. Penial retractor inserts terminally at penis and at diaphragm. Vas deferens divided in thin distal section running along penis towards atrium and thicker proximal section along vagina and free oviduct. Vagina shorter than

free oviduct. The oviduct consists of a short narrower distal section and a broader and longer glandular proximal section. Reservoir of bursa copulatrix only slightly broadened.

Remarks

I could not examine type specimens of *Helix volutella* Gassies, 1858 (not L. Pfeiffer, 1856) and *Helix cabriti* Gassies, 1863 from Balade. However, only *D. vaysseti* is known from this region of New Caledonia. The description and the measurements of *H. volutella* Gassies fit *D. vaysseti*. Thus, I consider this preoccupied name a synonym of *D. vaysseti*. *Helix cabriti* Gassies includes besides the specimens from Balade also specimens from the Île Art that belong to a different species that is treated in the following as *D. cabriti*.

There are two specimens of *D. vaysseti* from the northwest end of New Caledonia (Mandjelia and Le Cresson) which are 2.8 and 3.1 mm broad at 5 whorls, but have a weak callus and there are two specimens from Monéo which have a strong, detached callus, but which are only 2.3 mm broad at five whorls. These exceptions may be due to ancestral polymorphism, convergence or introgression between *D. vaysseti* and *D. solidula*.

### ***Diplomphalus cabriti*** (Gassies, 1863) (Figs 9; 10A)

*Helix cabriti* Gassies, 1863: 21 (in part); type locality (here restricted): "Île Art", New Caledonia. — Crosse 1867b: 315, pl. 11, fig. 2 (in part). — Gassies 1871: 38 (?). — Fischer 1873: 9, pl. 3, fig. 8, 9.

*Diplomphalus cabriti* – Crosse & Fischer 1872: 288. — Crosse & Fischer 1873: 22 (in part). — Tryon 1885: 113, pl. 25, figs 91, 92. — Kobelt 1904: 87, pl. 13, figs 21, 22 (in part). — Franc 1957: 176, pl. 23, fig. 233 (in part). — Schileyko 2000: 752, fig. 980.

*Diplomphalus* (*Diplomphalus*) *cabriti* – Crosse 1895: 173 (in part). — Wenz & Zilch 1960: 551, fig. 1926.

Type material. — Île Art, lecto- and paralectotype (NHMUK 1883.11.10.289, 290).

Other material examined. — New Caledonia (FMNH 36985; MNHN, among others voucher specimen of Crosse [1867b: 315, pl. 11, fig. 2]); Île Art (MNHN; RBINS).

Distribution (Fig. 9). — *Diplomphalus cabriti* is known only from the Île Art without more exact locality. A record from Pouébo in the northernmost part of the main island of New Caledonia (Gassies 1871; Crosse & Fischer 1873) is probably erroneous or might refer to *Diplomphalus vaysseti* (see also *D. montrouzieri* (Souverbie, 1858)).

Diagnosis. — *Diplomphalus cabriti* differs from all other *Diplomphalus* species in a larger shell (diameter: 8.2-9.0 mm v 4.4-7.9 mm in all other species).

Description

Shell (Fig. 10A; Table 1) biconcave; spire deeply sunken, with 8.75-9.75 whorls with a compressed keel at upper side and an edge at basal side; protoconch smooth; teleoconch with coarse, regular ribs (26-39 per quarter on upper side of body whorl) at upper and basal side that usually split into 2-3 finer ribs at outer side of whorls between upper and lower edge and microscopic spiral threads; corneous with a reticulate pattern of reddish-brown diagonal stripes; aperture narrow crescentic, slightly wider below than above; upper insertion of peristome distinctly descending towards aperture; peristome slightly expanded, not reflexed, slightly thickened; insertions of peristome connected by a weak callus which is thickened at its margin, but not detached from body whorl; aperture without lamellae or folds; umbilicus wide.

Genitalia unknown.

Radula. Fischer (1873) counted 16 about equally long, slender, unicuspid lateral teeth on each side. He did not find central teeth, but if they are as small as in *D. mariei*, he might have missed them.

Remarks

Gassies (1863) included specimens from Balade probably belonging to *Diplomphalus vaysseti* (see above) as well as specimens from the Île Art in his *Helix cabriti*. All later descriptions and figures of *D. cabriti* refer to the species from the Île Art. I could not examine type specimens of *H. cabriti* from Balade. However, there are two specimens from the Île Art labelled as types of *H. cabriti* Gassies in the Natural History Museum in London (NHMUK 1883.11.10.289-290). I designate one

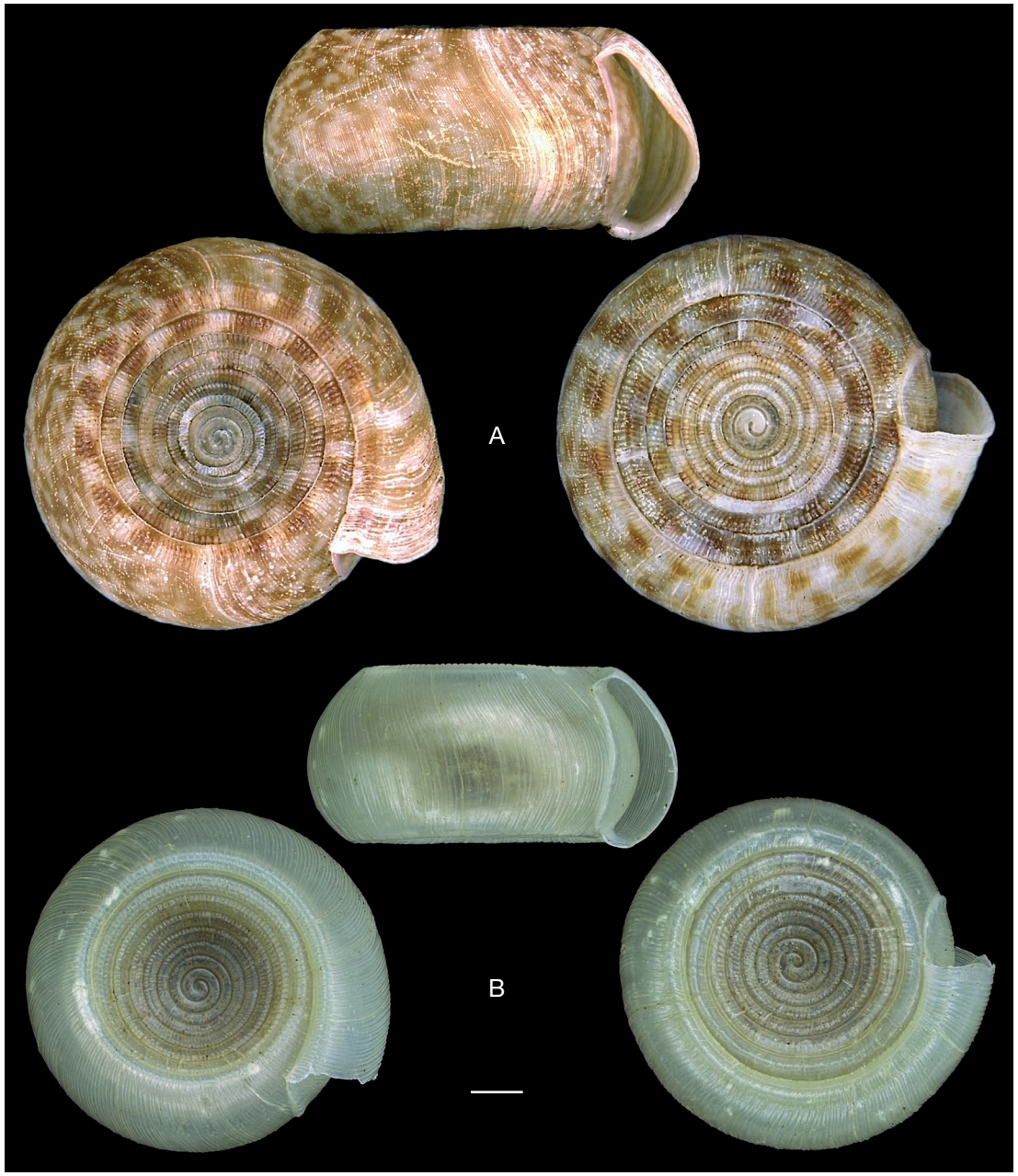



Fig. 10. — *Diplomphalus* spp. shells: **A**, *Diplomphalus cabriti* (Gassies, 1863), New Caledonia, Île Art (upper side and front view of lectotype and basal side of paralectotype BMHN 1883.11.10.289-290); **B**, *Diplomphalus montrouzieri* (Souverbie, 1858), New Caledonia, Île Art (syntype, MNHN). Scale bar: 1.0 mm.

of these specimens (the one glued at the basal side to the card board; measurements shell diameter: 9.1 mm, shell height: 4.2 mm) as lectotype of *H. cabriti* Gassies, 1863 to clarify the taxonomic status of the name and to preserve stability of nomenclature.

*Diplomphalus cabriti* is probably most closely related with *D. montrouzieri*, which is also larger than the *Diplomphalus* species from the main island of New Caledonia and which also has a callus which is thickened at its margin, but is not detached from the body whorl.

### ***Diplomphalus montrouzieri*** (Souverbie, 1858) (Figs 9; 10B)

*Helix montrouzieri* Souverbie, 1858: 63; type locality: "Artensis insula", New Caledonia. — Fischer 1858: 296, pl. 8, fig. 7. — Gassies 1863: 20, pl. 1, fig. 3. — Gassies 1871: 38.

*Diplomphalus montrouzieri* – Crosse & Fischer 1873: 23. — Tryon 1885: 113, pl. 25, fig. 90. — Kobelt 1904: 87, pl. 14, figs 1, 2. — Franc 1957: 177.

*Diplomphalus* (*Diplomphalus*) *montrouzieri* – Crosse 1895: 175.

Type material. — Île Art, 3 syntypes (MNHN).

Other material examined. — New Caledonia (FMNH 36983, 36984; MNHN); Île Art (MNHN, among others 3 syntypes of *H. montrouzieri* Souverbie; RBINS; ZMH 79088); "Pouébo" (MNHN); "Canala" (RBINS).

Distribution (Fig. 9). — *Diplomphalus montrouzieri* is probably restricted to the Île Art. There is a sample from Pouébo in the northern part of the main island of New Caledonia (MNHN) from where *D. montrouzieri* and also *D. cabriti* have been recorded by Gassies (1871). However, neither of these species has been found in that region of the main island of New Caledonia for more than a century, although several expeditions have collected there. There is also a sample that is allegedly from Canala (RBINS), but this is almost certainly an error.

Diagnosis. — *Diplomphalus montrouzieri* is larger than the *Diplomphalus* species from the main island of New Caledonia, but smaller than *D. cabriti* (diameter of *D. montrouzieri*: 6.7-7.9 mm; of *D. cabriti*: 8.2-9.0 mm), from which it differs also in a whitish shell colour without brownish pattern and a weaker sculpture of the teleoconch.

Description

Shell (Fig. 10B; Table 1) biconcave; spire deeply sunken, with 8.0-8.50 whorls with a compressed edge at upper side and an edge at basal side; protoconch smooth; teleoconch with flat, regular ribs (21-31 per quarter on upper side of body whorl) at upper and basal side that usually split into 2-3 finer striae at outer side of whorls between upper and lower edge and microscopic spiral threads; whitish; aperture narrow crescentic; upper insertion of peristome distinctly descending towards aperture; peristome not expanded, not reflexed, not thickened; insertions of peristome connected by a weak callus thickened at its margin, but not detached from body whorl; aperture without lamellae or folds; umbilicus wide.

Genitalia unknown.

## Genus *Pseudomphalus* Ancey, 1882

*Pseudomphalus* Ancey, 1882: 86. Type species (subsequent designation by Wenz & Zilch, 1960: 551): *Helix fabrei* Crosse, 1875 (= *Helix megei* Lambert, 1873).

Diagnosis. — *Pseudomphalus* differs from *Diplomphalus* in the short penis with a large conic flagellum, the fusiform vas deferens and the larger shell (9.2-17.1 mm) with rounded, widely overlapping whorls, a weaker sculpture and a narrower umbilicus.

### ***Pseudomphalus megei*** (Lambert, 1873) (Figs 3B; 4E; 5B; 6C, D; 9; 11)

*Helix megei* Lambert, 1873a: 136; type locality: "Baie du Sud", New Caledonia; 1873b: 356, pl. 14, fig. 3. — Gassies 1880: 30, pl. 1, fig. 20.

*Diplomphalus fabrei* Crosse, 1875: 136, pl. 6, fig. 1; type locality: "Baie du Sud", New Caledonia. — Thiele 1931: 725, fig. 766.

*Diplomphalus megei* var. β – Crosse 1875: 138, pl. 6, fig. 2.

*Helix fabrei* – Gassies 1880: 32, pl. 4, fig. 12.

*Pseudomphalus fabrei* – Ancey 1882: 86. — Schileyko 2000: 752, fig. 979.

*Pseudomphalus megei* – Ancey 1882: 86.

*Diplomphalus* (*Pseudomphalus*) *megei* – Tryon 1885: 115, pl. 24, figs 59, 60, 82-84. — Crosse 1895: 181.

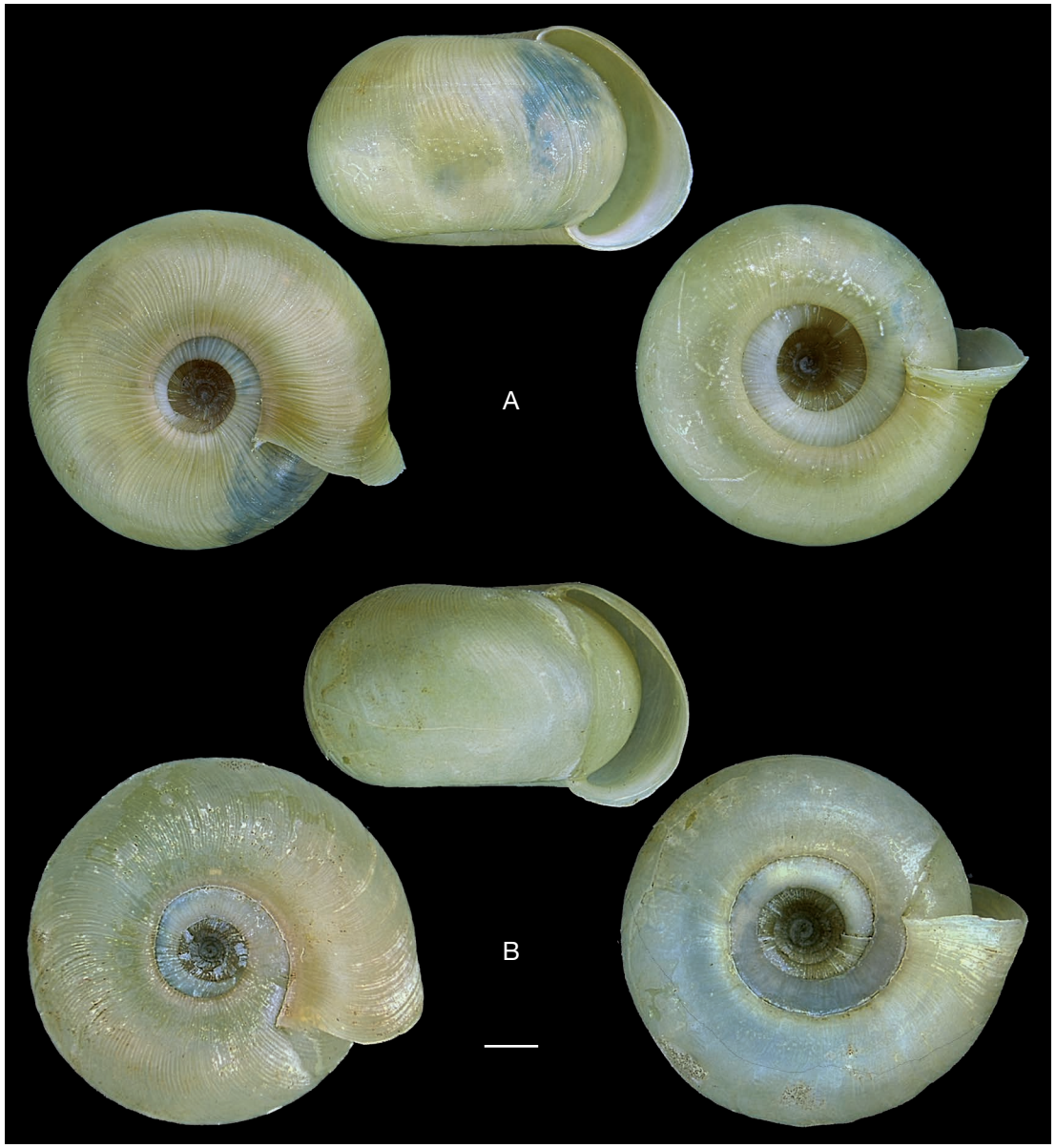



FIG. 11. — *Pseudomphalus megei* (Lambert, 1873) shells; **A**, New Caledonia, Baie du Sud (MNHN); **B**, New Caledonia, Baie du Sud (syntype of *D. fabrei*, MNHN 22959). Scale bar: 2.0 mm.

*Diplomphalus* (*Pseudomphalus*) *fabrei* – Tryon 1885: 115, pl. 24, figs 85-87. — Crosse 1895: 182. — Wenz & Zilch 1960: 551, fig. 1927.

*Diplomphalus* (*Pseudomphalus*) *megei* var. β – Crosse 1895: 181.

*Diplomphalus megei* – Franc 1957: 176, pl. 23, fig. 232.

TYPE MATERIAL. — *D. megei*: Baie du Sud, one syntype (MNHN); *D. fabrei*: Baie du Sud, one syntype (MNHN 22959).

TABLE 2. — Shell measurements (in mm) and ratios of *Pseudomphalus megei* (Lambert, 1873), various localities, n = 20. Abbreviations: **D**, shell diameter; **D3W**, diameter of the first three whorls; **da**, diameter of the aperture; **H**, shell height; **ha**, height of the aperture; **U**, umbilicus; **W**, number of whorls.

| | D | D3W | H | da | ha | U | W | D/H | H/ha | da/ha | U/D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| min | 9.2 | 1.3 | 6.0 | 3.7 | 6.0 | 2.3 | 4.75 | 1.5 | 1.0 | 0.6 | 0.3 |
| max | 17.1 | 1.7 | 9.2 | 6.5 | 9.2 | 7.4 | 6.5 | 1.9 | 1.0 | 0.8 | 0.4 |
| mean | 13.3 | 1.5 | 7.5 | 5.3 | 7.5 | 4.7 | 5.6 | 1.8 | 1.0 | 0.7 | 0.4 |
| std | 2.2 | 0.1 | 0.9 | 0.7 | 0.9 | 1.4 | 0.6 | 0.1 | 0.0 | 0.0 | 0.1 |

OTHER MATERIAL EXAMINED. — New Caledonia (FMNH 36989-36991, 91902; MNHN, among others 4 voucher specimens to Crosse 1875: 138, pl. 6, fig. 2 and Franc 1957: 176, pl. 23, fig. 232; RBINS); Bogui-Col des Rousettes, 270 m alt., 21°24'55"S, 165°26'49"E (MNHN); Col des Roussettes, 500 m alt., 21°25'13"S, 165°27'53"E (MNHN); Col d'Amieu, 420 m alt., 21°33'58"S, 165°46'16"E (MNHN); Mt. Table Unio, 500 m alt., 21°34'44"S, 165°45'06"E (MNHN); Col d'Amieu, summit, La Foa-Canala highway, 500 m alt., 21°37'S, 165°49'E (FMNH 158425, 158426); Haute Rivière Bleue, 250-350 m alt., 22°04'27"S, 166°37'10"E (MNHN); Haute Rivière Bleue, 230 m alt., 22°04'40"S, 166°37'24"E (MNHN); Piste de la Pourina, 520 m alt., 22°05'00"S, 166°41'45"E (MNHN); Piste de la Pourina, 150-250 m alt., 22°05'58"S, 166°41'17"E (MNHN); Baie du Sud (MNHN 22959, one syntype of *D. fabrei*, MNHN, among others one syntype of *D. megei*); Rivière Bleue, 170 m alt., 22°05'59"S, 166°40'01"E (MNHN); Rivière Bleue, 160 m alt., 22°06'13"S, 166°39'16"E (MNHN); Rivière Blanche, 160-170 m alt., 22°08'09"S, 166°38'20"E (MNHN); Rivière Blanche, Parc de réadaption des Cagous (MNHN); near Mt. Ouenarou, 30 km NE of Nouméa (towards Yaté) (FMNH 159232); Waho, 20 m alt., 22°10'00"S, 166°56'23"E (MNHN); Mont Guemba, 450 m alt., 22°10'22"S, 166°56'10"E (MNHN); N of col de Mouirange, 220-230 m alt., 22°11'57"S, 166°39'52"E (MNHN); St. Gabriel towards mine Ni, 200 m alt., 22°12'00"S, 166°58'00"E (MNHN); Haute Napouéredjeine, 250 m alt. (MNHN); N of Grand Lac, 310 m alt., 22°13'09"S, 166°55'03"E (MNHN); S of Grand Lac (Schileyko, 2000); Pic du Pin, E slope, 250 m alt., 22°14'07"S, 166°49'45"E (MNHN); Nouméa, 22°16'S, 166°27'E (MNHN); Forêt Nord, 200-250 m alt., 22°17'00"S, 166°53'00"E (MNHN); Prony, 22°19'S, 166°49'E (MNHN; RBINS); Baie du Prony (FMNH 110157, 123621; RBINS); Kwa Néïe (Mts. Néngoné), 470 m alt., 22°19'09"S, 166°55'12"E (MNHN).

DISTRIBUTION (FIG. 9). — *Pseudomphalus megei* is restricted to two disjunct areas in the southern half of New Caledonia, one between the Col des Rousettes and Mt. Table Unio and one at the southern tip of the island.

DESCRIPTION

Shell (Figs 5B; 11; Table 2) biconcave; spire deeply sunken, with 5.75-6.50 rounded whorls; protoconch with a pitted microsculpture with indistinct spiral lines; teleoconch rib-striated; brownish-corneous; aperture narrow crescentic; upper insertion of peristome not descending towards aperture; peristome expanded, not reflexed, not or slightly thickened inside; insertions of peristome connected by a very weak callus; aperture without lamellae or folds; umbilicus wide.

Genitalia (Fig. 4E). One specimen from Rivière Bleue was examined. The genital pore is situated posterior to the right ommatophore. The genitalia run to the right of the right ommatophoral retractor. Penis short, with long conic flagellum. There is a V-shaped pilaster inside penis. Penial retractor inserts at base of flagellum. In the examined specimen the penis retractor fused with the tentacle retractors and there was no branch inserting at vagina as in the specimen figured by Schileyko (2000: 752, fig. 979). Vas deferens fusiform, narrow at the insertion at penis, but becoming broad in its middle section. Vagina much shorter than free oviduct. Bursa of bursa copulatrix short, slightly enlarged.

Mantle collar and pallial complex (Fig. 3B). Mantle collar broad (integument inserts deeply at the mantle edge), forming a simple rim around the body without large lobes. Heart more than half as long as kidney, continuing anteriorly into indistinct pulmonary vein. Lung without additional coarse venation. Kidney long, opening anteriorly into reflexed primary ureter. Primary ureter running to the extreme posterior corner of the pulmonary cavity, where it transitions into the tubular secondary ureter, running along hindgut to the pnemostome. There is no distinct mantle gland posterior to the mantle collar.

Radula (Fig. 6C, D). Narrow; central teeth missing, only a rudimentary basal structure visible; 28 long, unicuspid lateral teeth on each side in V-shaped rows; broader basal part of lateral teeth attached with a small projection to the membrane, apical part curved towards the centre; lateral teeth becoming smaller towards the margin of the radula. In the figured radula two columns are formed abnormally, one with rudimentary teeth and one with split, bicuspid teeth.

REMARKS

*Diplomphalus fabrei* was correctly synonymised with *Pseudomphalus megei* by Franc (1957). It was based on specimens that have more whorls and are consequently larger, but they cannot otherwise be distinguished from typical *Pseudomphalus megei*.

## DISCUSSION

*Diplomphalus* shares with *Ouagapia* Crosse, 1894 (including *Ptychorhytida* Moellendorff, 1903) a subterminal insertion of the vas deferens directly at the penis and the division of the vas deferens in a thin distal section that runs along the penis towards the atrium and a thicker proximal section along the vagina and the free oviduct (Kondo 1943; Schileyko 2000; unpubl. data). The vas deferens inserts directly at the penis and has a thickened proximal section also in *Pseudomphalus*. However, the penial retractor inserts laterally at the penis in *Pseudomphalus*, whereas it inserts terminally in *Diplomphalus* and *Ouagapia* as well as in several other Rhytididae (Schileyko 2000). Nevertheless, the sunken spire might be a synapomorphy of *Diplomphalus* and *Pseudomphalus*. The direct lateral or subterminal insertion of the vas deferens at the penis might be a synapomorphy of the New Caledonian genera and some taxa from New Zealand, e.g., *Delos* Hutton, 1904, *Delouagapia* Powell, 1952 and *Powelliphanta* O'Connor, 1945 (Climo 1973, 1977; Goulstone & Brook 1999; Schileyko 2000).

This taxonomic revision resulted in a re-definition of the species boundaries within *Diplomphalus* compared with the last revision of by Franc (1957). The total number of accepted *Diplomphalus* species decrease from six to five. More importantly, there are reliable data about the distribution of the *Diplomphalus* and *Pseudomphalus* species for the first time, which can be used in biogeographical and ecological analyses of the New Caledonian land snail fauna.

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